

# **What papers should I cite from my reading list? User evaluation of a manuscript preparatory assistive task**

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# BACKGROUND

- Information Retrieval (IR) and Recommender Systems (RS) techniques have been used to address:-
  - ✓ Literature Review (LR) search tasks
  - ✓ Explicit and implicit ad-hoc information needs
- Examples of such tasks include
  - ✓ Building a reading list of research papers
  - ✓ Finding similar papers
  - ✓ Recommending papers based on query logs
  - ✓ Recommending papers based on publication history
  - ✓ Serendipitous discovery of interesting papers and more....

***What about recommending papers during manuscript preparation (MP)?***

# ADDRESSED SCENARIOS IN MP

- Recommending papers based on **Citation Contexts** in manuscripts
- Recommending new papers based on **To-Be-Cited** papers from the draft manuscript's bibliography
- Recommending papers based on the **full text of the draft manuscript**

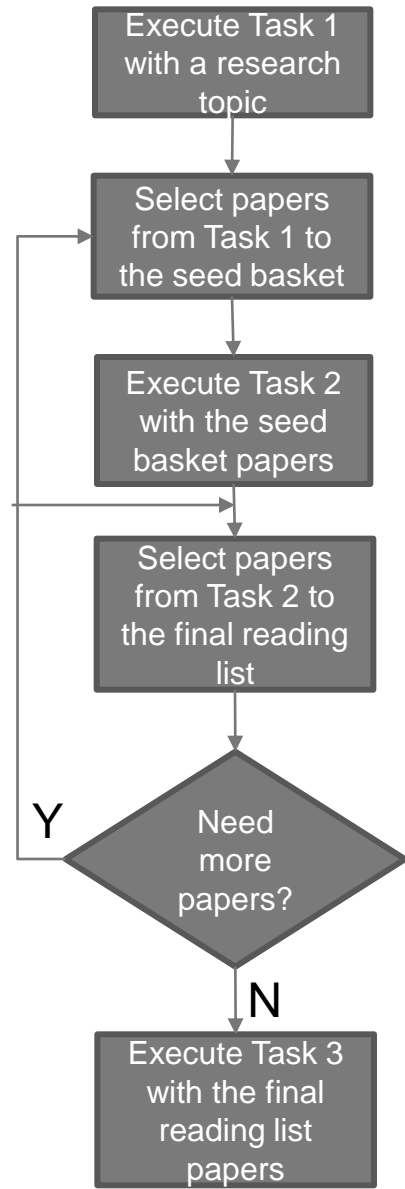
## ***What more could be done?***

- Few ideas....
- Explore the total list of papers compiled during literature review
- Explore the article-type preference to vary recommendations correspondingly?

# ENTER REC4LRW...

- Rec4LRW is a task-based assistive system that offers recommendations for the below tasks:-
  - ❖ Task 1 – Building an initial reading list of research papers
  - ❖ Task 2 – Finding similar papers based on a seed set of papers (multiple papers)
  - ❖ **Task 3 – Shortlisting papers from the final reading list based on article-type preference**
- The system is based on a threefold intervention framework
  1. Task reconceptualization
    - ✓ For better meeting the task requirements
  2. Novel informational display features
    - ✓ For speeding up the relevance judgement decisions
  3. Task interconnectivity
    - ✓ For establishing the natural relationships between tasks

# REC4LRW USAGE SEQUENCE



# CORPUS

- ACM DL extract of papers published between 1951 and 2011 used as corpus
- 103,739 articles and corresponding 2,320,345 references
- AnyStyle (<https://anystyle.io>) parser used to extract article title, venue and year from references
- Data stored in a MySQL database with the tables related using a partial snowflake schema

# TASK OBJECTIVE AND STEPS

- OBJECTIVE: To identify the important papers from the final reading list and vary recommendations count based on article-type preference

```
Input:  $P$  – set of papers in the final reading list
        $AT$  – article-type choice of the user
1:  $RC \leftarrow$  the average references count retrieved for  $AT$ 
2:  $R \leftarrow$  list of retrieved citations & references of papers from  $P$ 
3:  $G \leftarrow$  directed sparse graph created with papers from  $R$ 
4: run edge betweenness algorithm on  $G$  to form cluster set  $C$ 
5:  $S \leftarrow$  final list of shortlisted papers
6: if  $|C| > RC$  then
7:   while  $|S| = RC$ 
8:     for each cluster in  $C$  do
9:       sort papers in the cluster on citation count
10:       $s \leftarrow$  top ranked paper from the cluster
11:      add  $s$  to  $S$ 
12:     end for
13:   end while
14: else
15:    $N \leftarrow 0$ 
16:   while  $|S| = RC$ 
17:      $N \leftarrow N + 1$ 
18:     for each cluster in  $C$  do
19:       sort papers in the cluster on citation count
20:        $s \leftarrow N$  ranked paper from the cluster
21:       add  $s$  to  $S$ 
22:     end for
23:   end while
24: end if
25: display papers from  $S$  to user
```

# USER EVALUATION STUDY

- ❖ OBJECTIVE: To ascertain the usefulness and effectiveness of the task to researchers
- ❖ Ascertain the agreement percentages of the evaluation measures

| Measure              | Question                                                                                                                                            |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| Relevance            | The shortlisted papers are relevant to my article-type preference                                                                                   |
| Usefulness           | The shortlisted papers are useful for inclusion in my manuscript                                                                                    |
| Importance           | The shortlisted papers comprises of important papers from my reading list                                                                           |
| Certainty            | The shortlisted list comprises of papers which I would definitely cite in my manuscript                                                             |
| Good_List            | This is a good recommendation list, at an overall level                                                                                             |
| Improvement_Needed   | There is a need to further improve this shortlisted papers list                                                                                     |
| Shortlisting_Feature | I would like to see the feature of shortlisting papers from reading list based on article-type preference, in academic search systems and databases |

- ❖ Identify the top preferred and critical aspects of the task through the subjective feedback of the participants
  - Feedback responses were coded by a single coder using an inductive approach



# STUDY INFORMATION

- The study was conducted between November 2015 and January 2016
- Pre-screening survey conducted to identify participants who have authored at least one journal or conference paper
- 116 participants completed the whole study inclusive of the three tasks in the system
- 57 participants were Ph.D./Masters students while 59 were research staff, academic staff and librarians
- The average research experience for students was 2 years while for staff, it was 5.6 years
- 51% of participants were from the computer science, electrical and electronics disciplines, 35% from information and communication studies discipline while 14% from other disciplines

# STUDY PROCEDURE

**Step 1:** Participant selects one of the available 43 topics for executing task 1

**Step 2:** Re-run task 1 and select at least five papers for the seed basket

**Step 3:** Execute task 2 with the seed basket papers

**Step 4:** Re-run task 2 (and task 1) to select at least 30 papers for the final reading list

**Step 5:** Execute task 3 with the final reading list papers and article-type preference

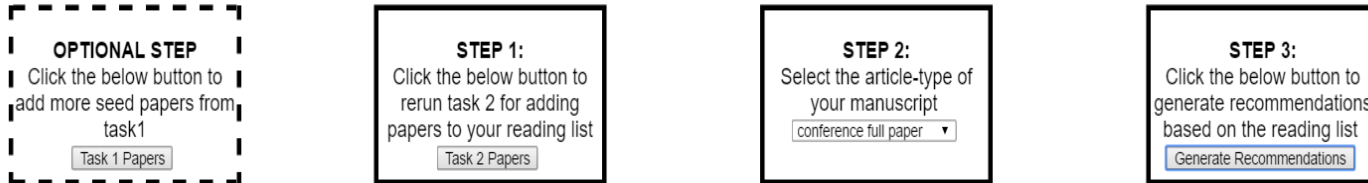
- Four article-type choices: conference full paper, poster, case study and a generic research paper

# SCREENSHOTS

Task 3 Instructions

## Rec4LRW - Scientific Paper Recommender System for Literature Review and Writing

### Task 3 - Shortlisting papers from reading list for inclusion in manuscript



### Shortlisted papers based on the article-type preference

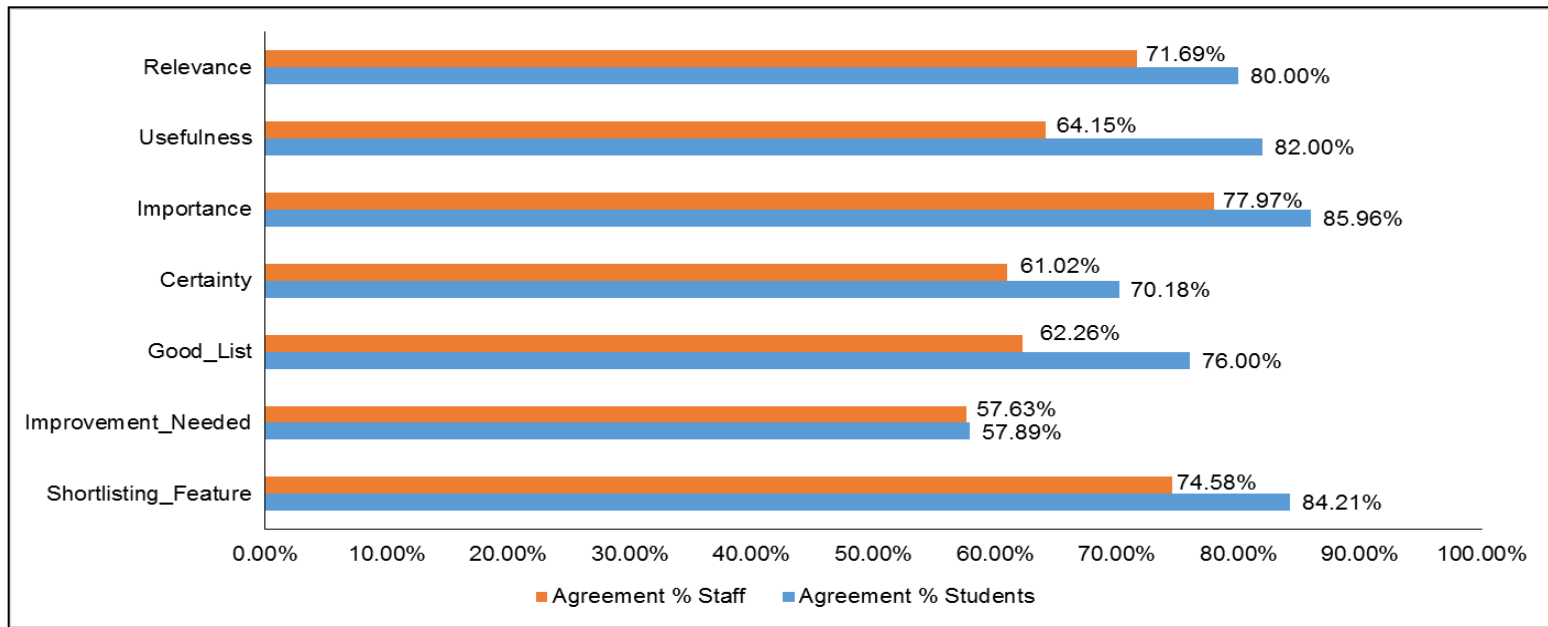
- 1) [SIA: secure information aggregation in sensor networks](#) **Popular**  
Bartosz Przydatek; Dawn Song; Adrian Perrig - Embedded networked sensor systems, 2003  
**Abstract:** *Sensor networks promise viable solutions to many monitoring problems. However, the practical deployment of sensor networks faces many challenges imposed by real-world demands.*  
**Author Specified Keywords:** approximate; information aggregation; interactive proofs; security; sensor networks  
Citation Count: 44 References Count: 27 [View papers in the parent cluster](#)
- 2) [The UCON<sub>ABC</sub> usage control model](#) **Popular**  
Jaehong Park; Ravi Sandhu - ACM Trans. Inf. Syst. Secur., 2004  
**Abstract:** *In this paper, we introduce the family of UCON<sub>ABC</sub> models for usage control (UCON), which integrate Authorizations (A), oBligations (B), and Conditions (C). The term usage control is a generalization of access control to cover authorizations, obligations, conditions, continuity (ongoing controls), and mutability.*  
**Author Specified Keywords:** access control; digital rights management; privacy; trust; usage control  
Citation Count: 31 References Count: 43 [View papers in the parent cluster](#)
- 3) [Role-based access control for publish/subscribe middleware architectures](#) **Popular**  
András Belokosztolszki; David M. Eyers; Peter R. Pietzuch; Jean Bacon; Ken Moody - Distributed event-based systems, 2003  
**Abstract:** *Research into publish/subscribe messaging has so far done little to propose architectures for the support of access control, yet this will be an increasingly critical requirement as systems move to Internet-scale. This paper discusses the general requirements of publish/subscribe systems with access control. We then present our specific integration of OASIS role-based access control into the Hermes publish/subscribe middleware platform. Our system supports many advanced features, such as the ability to work within a network where nodes are attributed different levels of trust, and employs a variety of access restriction methods which balance expressiveness with the content-based routing optimisations available. We illustrate our achievements by discussing an application scenario in which our system will be of particular use.*  
**Author Specified Keywords:** broker trust; publish/subscribe; restriction of advertisements/subscriptions; role-based access control  
Citation Count: 45 References Count: 10 [View papers in the parent cluster](#)
- 4) [PSFQ: a reliable transport protocol for wireless sensor networks](#) **Popular**  
Chieh-Yih Wan; Andrew T. Campbell; Lakshman Krishnamurthy - Wireless sensor networks and applications, 2002  
**Abstract:** *We propose PSFQ (Pump Slowly, Fetch Quickly), a reliable transport protocol suitable for a new class of reliable data applications emerging in wireless sensor networks. Due to the application-specific nature of sensor networks, it is difficult to design a single monolithic transport system that can be optimized for every application.*  
**Author Specified Keywords:** reliable transport protocols; wireless sensor networks  
Citation Count: 39 References Count: 14 [View papers in the parent cluster](#)
- 5) [ESRT: event-to-sink reliable transport in wireless sensor networks](#) **Popular**  
Yogesh Sankarasubramaniam; Ozgur B. Akan; Ian F. Akyildiz - Mobile ad hoc networking & computing, 2003  
**Abstract:** *Hence, conventional end-to-end reliability definitions and solutions are inapplicable in the WSN regime and would only lead to a waste of scarce sensor resources. To the best of our knowledge, reliable transport in WSN has not been studied from this perspective before in order to address this need, a new reliable transport scheme for WSN, the event-to-sink reliable transport (ESRT) protocol, is presented in this paper.*  
**Author Specified Keywords:** congestion control; energy conservation; event-to-sink reliability; reliable transport protocols; wireless sensor networks  
Citation Count: 31 References Count: 13 [View papers in the parent cluster](#)
- 6) [Sensor networks for medical care](#)  
Victor Shnayder; Bor-rong Chen; Konrad Lorincz; Thaddeus R. F. Fulford Jones; Matt Welsh - Embedded networked sensor systems, 2005  
**Abstract:** *No data*  
**Author Specified Keywords:** medical sensor networks; sensor query processing; wireless routing; wireless sensor networks  
Citation Count: 28 References Count: 3 [View papers in the parent cluster](#)

Time taken for shortlisting articles = 6 seconds

[Click here to start evaluation of this task](#)

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# RESULTS



- Biggest differences found for the below measures:-
  - Usefulness (82.00% for students, 64.15% for staff)
  - Good\_List (76.00% for students, 62.26% for staff)
- The measures with the highest agreement:-
  - Importance (85.96% for students, 77.97% for staff)
  - Shortlisting\_Feature (84.21% for students, 74.58% for staff)

# QUALITATIVE FEEDBACK

| Rank | Preferred Aspects Categories              | Critical Aspects Categories                 |
|------|-------------------------------------------|---------------------------------------------|
| 1    | Shortlisting Feature & Rec. Quality (24%) | Rote Selection of Papers (16%)              |
| 2    | Information Cue Labels (15%)              | Limited Dataset Issue (5%)                  |
| 3    | View Papers in Clusters (11%)             | Quality can be Improved (5%)                |
| 4    | Rich Metadata (7%)                        | Not Sure of the Usefulness of the Task (4%) |
| 5    | Ranking of Papers (3%)                    | UI can be Improved (3%)                     |

- The newly introduced informational display features were a big hit
- The purely experimental nature of the study affected the experience of participants
- Task's effectiveness needs to be validated with a longitudinal study with a large collection of papers in the final reading list

# LIMITATIONS

- Lack of an offline evaluation experiment
- Study procedure involved selection of comparatively fewer number of papers in the final reading list
- Not much variations in the final shortlisted papers for the different article-type preferences
- Information displayed in a purely textual manner

# FUTURE WORK

- The scope for this task will be expanded to bring in more variations for the different article-type choices
- Inclusion of new papers in the output which could have been missed during the literature review
- Provide more user control in the system so that the user can select papers as mandatory to be shortlisted
- Integrate this task with the citation context recommendation task
- Represent the information in the form of citation graphs

# GET ACCESS TO REC4LRW...

Click the link <http://goo.gl/XgynzY> or scan the below QR code



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